Project: **721**

Project title: **COSMO/CLM Training**

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The Numerical Model Training Course 2024 for the ICON model took place at the DWD headquarter in Offenbach from 10-14 June 2024. The training was organized by DWD in collaboration with the COSMO partner weather services and the CLM Community.

The application areas of the ICON model range from numerical weather prediction (NWP) and regional climate simulations (CLM - Climate Limited Area Model) to the prediction of trace substance dispersion with ICON-ART. Therefore, national meteorological services, universities and research institutions are among the ICON users and the target groups of the training course. Each morning, lectures on the physical basics of the ICON model, data output of the DWD and technical details of ICON (incl. the community interface ComIn) were scheduled. In the afternoon, practical exercises allowed participants to learn how to run ICON simulations.

The practical exercises were split into three parts, that were tailored to the needs of the different groups of participants. NWP for universities (Academia), regional climate simulations (CLM) and NWP for national weather services (MetServices). The Academia and CLM course were performed on the HPC Levante at the German Climate Computing Center (DKRZ), while the MetService course was run on ECMWF's ATOS system. We want to thank DKRZ and ECMWF for the resources and their support.

The exercises of the 'Academia' group covered a wide range of ICON functionalities, from idealised test cases to global simulations, ICON-LAM (limited-area mode) and changes to the source code. These exercises were a continuation of the ICON training that has been successfully carried out repeatedly over the past ten years. One new feature was an exercise block on the ICON Community Interface (ComIn), which allows independent source code in various programming languages to be linked to the ICON model. Use cases include diagnostics, connection models (e.g. chemistry or hydrology), Python scripts (e.g. in-situ visualisation, ML applications) or interpolation of input and output data.

The CLM part of the course provided an introduction to ICON-CLM and the Starter Package for ICON-CLM Experiments (SPICE). SPICE is a runtime environment for performing regional climate simulations with ICON-CLM which was developed within the CLM Community. Participants learned how to install and configure SPICE and how to use it to run simulations. In special exercises the participants learned which steps are necessary to perform a simulation for a different time period, a different area and with different boundary conditions. Furthermore, it was explained how to create a simulation with convection permitting resolution. Boundary data were provided by a previously created experiment with coarser resolution. Analysing the results with the evaluation tool EvaSuite included in SPICE has been explained as well as the use of the community interface that became available with the first open source release of ICON in January 2024.

As part of the training course, the ICON tutorial was also revised and published. The ICON tutorial is updated with every training course and is now the most comprehensive model documentation available for the ICON model.

In total, 150 persons applied for participation in the training course. The organizers could welcome 64 participants in Offenbach for the course. Many participants from weather services were able to take part as part of collaborations with BGR (Federal Institute for Geosciences and Natural Resources), GIZ (German Society for International Cooperation) and WMO (World Meteorological Organisation).

We would like to thank the DKRZ support team for fast solutions to problems and the very kind support.